

HEINONLINE

Citation:

Bernard Strassburg, The Marriage of Computers and Communications - Some Regulatory Implications, 9 Jurimetrics J. 12 (1968)

Content downloaded/printed from [HeinOnline](#)

Mon Aug 27 10:49:10 2018

-- Your use of this HeinOnline PDF indicates your acceptance of HeinOnline's Terms and Conditions of the license agreement available at <https://heinonline.org/HOL/License>

-- The search text of this PDF is generated from uncorrected OCR text.

-- To obtain permission to use this article beyond the scope of your HeinOnline license, please use:

[Copyright Information](#)



Use QR Code reader to send PDF to your smartphone or tablet device

THE MARRIAGE OF COMPUTERS AND COMMUNICATIONS – SOME REGULATORY IMPLICATIONS

Bernard Strassburg
Chief, Common Carrier Bureau
Federal Communications Commission

*Address to Association for Computing Machinery,
Washington, D.C. Chapter, on October 20, 1966*

I. Introduction

Few products of modern technology have as much potential for social, economic, and cultural benefit as does the multiple access computer. With its huge capacity and versatility and in combination with communications—also in the forefront of the technological revolution—the computer is a storehouse of virtually untapped new and improved services to the public. Some services which are being offered or which may be introduced in the near future include banking by phone, national credit systems, remote library inquiry, programmed educational systems, legal indexing services, automatic reservation systems, remote typing and editing pools, and medical information systems. Understandably, considerable excitement has been generated by the promise of the new or better way of life which this technological change holds. Indeed, much has been written both about the possibilities presented and about the problems that must be resolved to realize these possibilities, and I am sure that as we study the impact of the computer on society we will discover a myriad of additional potentials, each accompanied by its own set of problems.

The bare essentials of an on-line, real-time computer service appear to include the following: remote terminal stations such as teleprinters or display devices, a central complex of computers and peripheral equipment, communication lines that link remote terminals to the central computer, and memory banks of stored data made available to the user when he needs them. An important feature is the time-sharing concept which enables a multiplicity of users to have virtually simultaneous access to a computer's logic and memory, each subscriber at some distance from the computer site. The sending of electrocardiograph data from a ship in the Atlantic to a Boston hospital via Early Bird Satellite dramatizes the fact that the terminal station and the computer need not be adjacent to one another.

The potential of distributing computer "power" throughout a communications network has been likened to the distribution of electrical power. Whether accurate or not, the utility analogy has been applied to time-shared computer services, and it is unlikely that the term "computer utility" will be displaced despite the discomfort it causes many people in the data-processing field.

This discomfort is understandable. For the term "utility" generally implies "natural monopoly," and natural monopoly implies governmental restraint or

regulation of one kind or another. I certainly do not wish to dampen spirits by suggesting that the computer service industry or any of its segments are—presently or prospectively—necessarily candidates for regulation. At the same time, I believe that it may be thought-provoking to mention very briefly some of those characteristics which have, in other areas of our economy, required regulatory control of industries engaged in furnishing a public service. What then are some of the significant traits that identify such an industry as a natural monopoly? Generally the high capital cost of entering the industry is one such trait. Capital outlays may be prohibitive to all but a few corporations, necessarily limiting market entry and restricting competition.

A second characteristic, not unrelated to the first, is the high ratio of fixed to variable costs, which produce declining unit costs as output expands. If this phenomenon is generalized, then considerations of economy and efficiency favor, if not decree, the concentration of output in one or possibly a few firms rather than in many firms. And it is such concentration that dictates a need for public regulation, particularly in an industry having a vital public service mission.

The “natural monopoly” solution is not the norm, however, for most segments of our economy. On the contrary, the assumption of the free enterprise system is that economy and efficiency are generated best by having many firms competing for the consumer’s dollar. In short, competition is justified and encouraged because it leads to—indeed, requires—efficient performance. Only the future will tell what lies in store for an industry having the public service character of the computer service industry.

I will now attempt to identify some problems that are likely to attend the rise of local, regional, and perhaps national computer services.

II. Discussion of the Issues

There is always an element of risk in attempting to identify and anticipate future issues likely to emerge from commercial and other applications of a developing technology. Identifying potential problem areas arising from the growth of computer services is no less hazardous a task. Nevertheless, there is some evidence that our attention may be increasingly directed toward three problem areas. The first relates to market entry; the second, to the charges for, or costs of, communication lines; and the third, to the requirement to protect the privacy of information. Consider first the problem of market entry.

A. THE PROBLEM OF MARKET ENTRY

Both communication common carriers and data processing firms appear to be embracing the “computer utility” concept. Undoubtedly this action will produce some stresses and strains between these two industries.

It might be intriguing to explore where some of the competition may occur. But, as a prelude, let us look more closely at the credentials of each industry.

I. The Communication Common Carriers

Today’s domestic communication common carrier services are provided by the Bell Telephone System, about 2,000 other telephone companies which comprise the independent segment of the telephone industry, and the Western Union Telegraph Company. Only AT&T and Western Union operate nationwide intercity networks of communication circuits. Of the two, Western Union has been the most articulate in committing its future to offering “computer utility” services. The telegraph company has initiated several steps in this direction. It

has, for example, computerized the switching operation of its Telex network so as to make that network compatible with Bell's TWX service. This compatibility enables Telex subscribers to communicate fully with TWX subscribers. Western Union has also introduced a management information service whereby the company will package and assume complete responsibility for computer and communication components of commercial digital information systems. It will provide the computer hardware, software, and the communications circuitry, or any one of these components. Western Union plans to open data processing centers in competition with the service bureau industry. The telegraph company's message-forwarding service could easily be as extensive as its proposed data processing activities. Moreover, Western Union has introduced two specific data services, a legal index service and a nationwide job placement service. More such services are on the horizon. Finally, it cannot be forgotten that the telegraph company provides an extensive private wire service for both government and commercial subscribers. In sum, it is clear that the telegraph company is assembling the building blocks of nationwide computerized information services as it moves into the future.

By contrast, the Bell System has not articulated any intention to develop special computer services. If Bell did choose to do so, its ability to provide effective competition is obvious. It is, for example, computerizing its own circuit switching by introducing electronic switching systems into its central offices. Also noteworthy is the current program of the Bell System of placing the telephone records of all telephone subscribers on computers. Eventually, data on all 45 million subscribers of the Bell System will be instantaneously available for internal purposes from the computers through TWX connections. Bell also manufactures and supplies teletypewriter equipment commonly used as terminal station equipment. Perhaps most important, the Bell System owns most of the nation's communications circuits, which are essential ingredients of a "computer utility." It is important to note that these circuits, although intended primarily for voice transmission, can be modified to carry more and more digital traffic. Indeed, Bell has estimated that in the foreseeable future the flow of data will exceed that of voice.

In sum, then, we have a mixed picture if we look at the communications carriers' side of the entry question. Western Union is moving to furnish all components required for time-shared services; Bell is content thus far to lease its circuits and terminal apparatus.

2. The Data Processing Industry

The data processing industry is characterized by firms sponsoring different segments of the electronic data processing (EDP) package. The most conspicuous participants in multiple access systems are, of course, the computer manufacturers themselves. The very high cost of research, plant, and equipment needed to become a successful manufacturer of computers restricts entry into this market. Most of these firms not only supply hardware but operate data service centers as well. IBM typifies this vertical relationship; it is, by its marked predominance, the acknowledged leader in the industry.

In contrast to the manufacture of computer equipment, establishing a service bureau requires relatively little capital. Thus, entry into this market appears easy. We therefore find literally hundreds of service bureau operations—firms which sell computer time, data processing, or software packaging to the public.

Finally, several firms otherwise unconnected with the data processing industry offer commercial computer services as extensions of their own investment in computer systems. Generally, these firms have experienced either excess capacity or such computer load fluctuations that selling services outside their organization tends to share, hence cut, their overhead. Since entry into the market reduces cost, it can be expected that the number of these companies selling excess computer capacity will proliferate rapidly. The banking and aerospace industries furnish some examples of data processing activities arising as a consequence of excess computer capacity.

Given this résumé of the industry structure, what kind of time-shared services are in the offing? Again, IBM's activities are typical. Last year, for example, the company announced a computational service, called QUICKTRAN, for scientific and technical users. More recently, IBM introduced a marketing information service which incorporates Dun & Bradstreet marketing data with an economic model of the United States. This information is designed to help business firms to determine the marketing potential of new products or new services.

Still more recently, IBM announced a service called DATATEXT. As another time-shared service, DATATEXT enables secretaries to type, edit, update, and justify margins of letters, documents, and other business material. Whatever its potential as a remote typing pool, DATATEXT is unlikely to displace the Kelly Girl.

Other manufacturers are innovating time-shared services as well. General Electric, for example, has recently announced a medical information system—a system that computerizes bed inventories, drug prescriptions, billing, and a host of hospital administrative tasks. ITT has established a series of time-shared computer centers throughout the country. Stock quotation and reservation systems are already taking advantage of on-line, real-time systems. All of these services have one thing in common: They require communication lines between the customer and computer.

3. Problem Areas between and within the Communication-Data Processing Industries

As one witnesses the growing convergence of the data processing and the communications industries toward the "computer utility" concept, the question of market entry takes on both antitrust and regulatory overtones. In communications, for example, we have witnessed Western Union's moving to fulfill its goal as a supplier of information services. The Bell System, by contrast, appears content—at least in the short-term—to lease channels to business and government subscribers. Perhaps Bell's position regarding computer services can be explained by its antitrust Consent Decree of 1956. The Decree, among other constraints, restricts Bell's entrance into other than regulated common carrier offerings. Thus, the question as to whether computer services are communication common carrier services would appear to be an important factor in Bell's position in this field. Bell was recently queried on this point by the House Small Business Committee. The Bell System's position was that the inhibitions of the Consent Decree would not be applicable if the company filed and the FCC accepted a tariff for a computer service.

The Bell System is, of course, uniquely structured and equipped to enter the computer service field on the most comprehensive basis. Consider its nationwide network of local and intercity communications channels and its

ever-increasing use of electronic computers for furnishing improved communications switching services and for its own internal record keeping. Needless to say, any move by the Bell System to offer computer services to the public under a tariff filed with the FCC would be greeted with serious, if not apprehensive, concern by the computer industry. It certainly could be expected to give rise to significant regulatory problems for the FCC to resolve, as well as being of considerable interest to certain other government agencies.

IBM's Consent Decree likewise bears on the general question of market entry and the nature of IBM's participation in the "computer utility" field. The Decree sought to separate IBM's manufacturing activities from its service bureau activities. To this end, the company was required to establish Service Bureau Corporation (SBC) as a subsidiary of the parent firm, IBM. SBC could process customer data for a fee—an activity denied IBM. On the other hand, the Decree did not condemn IBM's data center machines to idleness. A customer could purchase idle time on IBM's machines to process its own data. The attempt to segregate excess computer time on one side and to direct handling of customer data (data processing) on the other may suffer under the strain of technological change. It may be an open question whether IBM's new remote, time-shared services are the selling of machine time or whether they are the processing of customer data for a fee. Once again, the question of definition is crucial. And while we don't pretend to know the answers to these questions, they quite obviously affect IBM's posture in the computer service industry.

No less intriguing are Western Union's diversification efforts in this field. As Western Union introduces computerized switching and data processing services, it offers, under tariffs, leased circuits to users of computers and competes with them as a processor of customer, payroll, inventory, and other corporate data. Its dual capability as a regulatory purveyor of communication links, on the one hand, and as a contender in the EDP market, on the other hand, hardly eases the regulatory dilemma of the Commission. For Western Union is reluctant to tariff the computer segment of its EDP services notwithstanding that this service also involves a message switching function which, traditionally, has been treated as a common carrier operation subject to regulation. Its argument simply is that to subject any portion of this offering to the pricing rigidities of a tariff would place Western Union at a competitive disadvantage in relation to the unregulated members of the data processing industry. At the same time, both Western Union and the Bell System have balked at leasing communication links to firms in the service bureau industry where such firms, as part of their undertaking, propose to engage in switching messages among their various customers. In this regard, both companies base their refusal on the provisions in their tariffs which are designed to prevent their customers for leased channels from using those channels to sell communication services to others in competition with the telephone and telegraph carriers. Needless to say, this tariff inhibition is a continuing source of irritation to the computer industry and, as such, is a subject of current regulatory attention by the FCC. As you can see, therefore, the policies and activities of the communication common carriers have a most significant bearing upon entry and participation in this burgeoning market and hence upon the structure, content, and future growth of the computer service industry.

B. COMMUNICATION COSTS

The problem of communication cost is no less provocative than the question of

market entry. It is apparent that as remote processing of data gains momentum, computer firms become increasingly dependent upon circuits provided by the common carriers. By virtue of this interdependence, the cost of obtaining those circuits is a matter of vital relevance to the economics of the data processing industry.

Communication line charges can be treated in both an absolute and a relative sense. In absolute terms, interstate communication rates have trended downward in the past twenty years. More recently, computer users have tended to look at the relative composition of the EDP-communication package. When computers were first introduced, the EDP costs for both hardware and software were of paramount significance compared to their communication counterpart. The trend of technology is apparently shifting this composition. There is some indication, although the evidence is far from conclusive, that some computer systems currently share the communications-EDP cost evenly. As this trend continues, with EDP cost halving every two years, the predominant cost incidence of "computer utility" service may therefore rest on the communications segment. Increasingly, the computer industry is taking a closer look at tariff rates and the derivation thereof. And this interest is not likely to decline with the constantly widening applications of time-sharing technology. On the contrary, if the economies of scale are as inviting as suggested by segments of the computer industry, then the communication cost may be expected to become the predominant cost of a "computer utility" service.

This phenomenon in computer productivity has intensified the computer industry's concern with the content of common carrier tariffs in its quest for cheaper circuits. This concern has been manifested not only with respect to the rate levels applicable to leased common carrier channels. It is directed also to the tariff restraints on channel sharing, because, at present, the tariffs permit such sharing only in certain circumstances. Interest is also focused upon the questions of minimum periods of use or billing time and of restraints on the use of customer-provided multiplexing equipment.

The Commission is not indifferent to these concerns. On the contrary, the matters involved are the subject of our active study with a view to determining the respects in which the tariff offerings of the carriers may fall short of meeting, on a just and reasonable basis, the communication requirements of the data processing industry. For the Commission is obliged by the policies and the objectives of the Communications Act to ensure that the nation's communication network is responsive to the requirements of an advancing technology. The Commission has the obligation, the authority, and the means to reappraise and refashion any established policies in order to promote the public interest through an effective realization of the social and economic benefits of current technology.

C. THE COMPUTER AND THE PROBLEM OF INFORMATION PRIVACY

A third problem that has been emerging with computer services relates to the protection of the integrity of information. Privacy is very much in the news lately, and well it might be. Some one recently observed that individual privacy is a function of the fragmentary nature of information. Throughout our lives we deposit a trail of information, beginning with the birth certificate and ending with the death certificate. Between these events, other vital statistics and data

are recorded. Our credit is classified, our income is declared, our intelligence is tested, our illnesses are catalogued, etc., etc. That this information is random and difficult to assemble is evident from the cost involved in hiring private detectives to assemble personal dossiers.

The use of computers to gather and store information systematically may remove this impediment, thereby driving down the cost of assembling and concentrating a wide range of personal data. The information, once assembled, can be used for good or ill. It can be abused—and the tape-to-tape transmission of such data between government agencies has rightfully become a matter of Congressional concern for protecting the individual's right of privacy.

This potential to invade privacy and pirate concentrated data is no less real in the private sector than it is in the public sector. For example, a common data bank which has memorized the customers, sales, inventories, and financial data of firms engaged in a competitive market poses unprecedented questions of privacy. Can proprietary information remain proprietary? Can unauthorized disclosure and abuse be prevented?

It is refreshing to note that members of the computer industry are aware of this problem. It is also refreshing to note that the computer industry is attempting to meet the problem through such measures as coded terminals and computer cryptographic techniques. The trade-off between EDP cost and individual privacy is now being discussed seriously.

In industry and government, those of us concerned with communications are most sensitive to the issue of privacy. We certainly cannot allow communication lines to become the Achilles' heel of the attempt to maintain the integrity of personal and proprietary data. Obviously, we have not as yet assessed the full range or possibilities in unauthorized persons' obtaining information from common data banks. Despite the infancy of the time-shared systems, it takes little imagination to realize that the question of privacy can become a crucial one. We intend to pay strict attention to this matter. If it should prove necessary to request legislative action to enable both the "computer utility" and the FCC to ensure the privacy of data, I am sure that the Commission will be prepared to make appropriate recommendations to the Congress.

I have discussed market entry, communication costs, and information privacy as three areas of potential, if not actual, issues incident to the "computer utility" concept. These are by no means the only issues. There will be others. But, whatever the issues, both the industry and the Commission have equally important roles to play in meeting the challenge of the new technology. In our search for information, for ideas, for answers, we welcome the continued help, suggestions, and advice of the data processing industry.